

# WEAVING LOOM

THE PRACTICAL HOUSEHOLDER

1958



**B**EFORE starting on the actual constructional details of this four-shaft, six-pedal loom, here is a brief description of some of the terms used in weaving and the parts of the loom which will be mentioned in this article.

The woven material is made up of threads running from front to back which are called the warp, and interwoven between these threads but from side to side are threads known as the weft. The warp is put on the loom before the weaving starts, and the weft is introduced by means of a shuttle passed from side to side through the shed. The shed is created by separating the threads of the warp into two groups through the medium of the shafts, which are in turn operated by the pedals. The warp is threaded through the eyes of string or wire healds which form part of the shafts, and the pedals cause half the shafts to rise while the other half fall, drawing the warp threads apart to form a "V"-shaped opening through which the shuttle is passed. The patterns are created by varying the order in which the pedals are operated, and the introduction of different colored threads both in the warp and the weft.

After the shuttle has carried the thread through the shed, the shafts are returned to the rest position, and the thread is beaten into place by the reed which, in its holder, is swung by the operator from back to front, thus forming the woven material. Various accessories are needed for the successful operation of the loom, and their construction or the way in which they can be obtained will be dealt with later.

The building of this loom requires a certain amount of skill in the use of carpenter's tools. It is suggested that machine-planed timber be used throughout, as the finished job must have no rough surfaces, otherwise the threads used in the weaving will get



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snagged and broken, causing delay and spoiling the finished work.

### FRAMEWORK

The basis of the loom is a solid frame (Fig. 1). This is constructed so that there is no possibility of its breaking up while the weaving is in progress, as the warp is held under considerable tensions, and any "give" in the squareness of this frame would make good weaving impossible.

Start with two pieces of well-seasoned timber 30in. by 4 1/2in. by 1in. thick, well planed and, if possible, free from knots, also two straight broomsticks at least 1 1/2in. diameter. Take one of the broomsticks (which will be called the spacers), cut off a short piece to leave a clean square end from which to measure 1 1/2in., and make a saw cut 1/2in. deep round the circumference. On the end surface with a pair of compasses mark a circle 1 1/2in. in-

circumference, and with the stick held firmly in the vice, carefully cut away the wood with a chisel (see Fig. 1) to form a shouldered bearing.

Now take one of the side frame timbers, and after cutting off the corners as shown, mark a point 6in. from the end and 2 1/2in. from the side, and drill a hole which will take the prepared end of the spacer to give a tight fit. If the first one is satisfactory, measure 35in. from the shoulder, mark and cut round 1/2in. deep, then measure 1 1/2in. and cut off the remainder. Treat this end in the same manner as before, and mark off and drill the other side frame timber to match the first.

Be accurate with this part of the work, because on it depends the whole success of the loom. When both spacers have been prepared and the holes drilled in the two ends of the side frame members, put some good quality glue on the ends of the spacers and drive them carefully into their respective holes until the shoulders are up against the main timber. If possible, put the work in cramps for 24 hours, making sure that the angles made by the sides and the spacers are all 90 deg., i.e., right-angles, and that the two side frame timbers are parallel, and when placed on a level surface lie perfectly flat and true. When the glue is set, cut off cleanly the protruding ends of the spacers and rub down with glasspaper.

Fig. 1.—The framework.

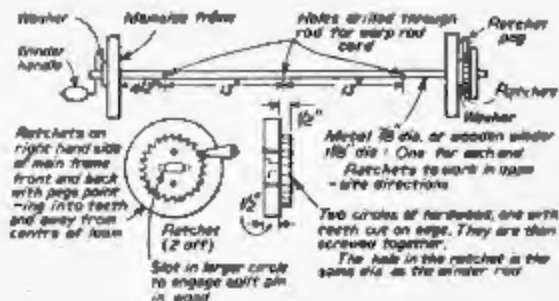
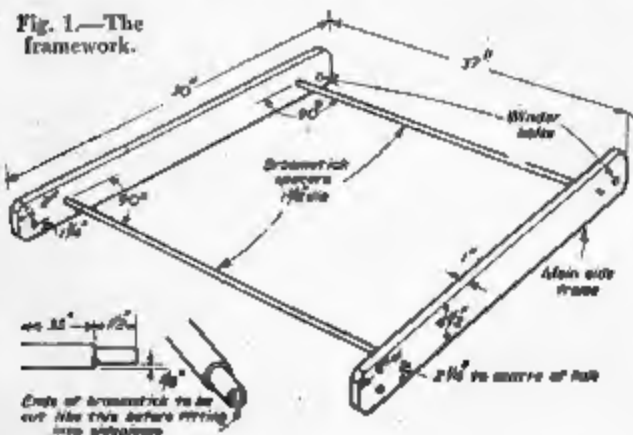


Fig. 2.—Winding rods and (right) ratchets.

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## WINDING RODS AND RATCHETS

Having prepared the main frame, the next job should be the winding rods and ratchets. It is recommended that these be made from  $\frac{1}{2}$  in. steel or galvanized iron tube and hardwood. Each winder should be approximately 4 in. long, and it will be necessary to drill three holes with  $\frac{1}{2}$  in. drill in the positions shown in Fig. 2. Drill a  $\frac{1}{2}$  in. hole 1 in. from the left-hand end for the winding handle, and when the ratchet has been made, drill a  $\frac{1}{2}$  in. hole for the split pin to hold the ratchet in place on the right-hand side of the rod. The four holes to take the winding rods should be drilled in the side timbers when the diameter of the rods has been measured. The holes should be only large enough for the rods to turn easily without slack.

To make the ratchets, cut from  $\frac{1}{2}$  in. thick hardwood two 4 in. and two 3 in. circles of wood. The two larger ones should have their edges smoothed off with a rasp so that they are easy to grip. Then deal with the two smaller ones as follows: Using the centre point, draw a circle  $1\frac{1}{2}$  in. radius, put a pin in the centre, and then, keeping your ruler against the pin, mark the lines from the circle to the edge of the wood at  $\frac{1}{2}$  in. points. Having done this completely round, join the top of one line with the bottom of the one preceding it, and cut carefully with a fine saw.

When the two ratchet circles are finished, lay them on the larger circles so that the teeth point in opposite directions. This is necessary, because the two winders are going to strain against each other, therefore the ratchets must work in opposite direc-

**● Ever tried your hand at weaving? It's a fascinating and profitable hobby. This loom will weave patterned fabrics and rugs up to 32 inches wide**

tions. Screw and glue the two pairs together, and then drill out the centres to fit the winding rods. In the larger piece cut two slots in from the centre hole  $\frac{1}{2}$  in. x  $\frac{1}{2}$  in., but only into half the thickness of the wood ready for locking the ratchet on to the winding rod.

The winding handles are made from  $\frac{1}{2}$  in. mild steel rod 8 in. long, bent at right angles at 5 in., and drilled  $\frac{1}{2}$  in. from each end to take a small split pin. A piece of broomhandle cut to size and drilled through the centre completes this part of the work.

The winding rods should not be fitted permanently at this stage, but

to have them all ready, fit the winding handles so that they both come on the same side of the main frame on the left hand looking at the front of the loom. Put on a large washer, pass the winder rod through the holes of the main frame, then another large washer, followed by the ratchets, teeth side inwards. Now mark the rod where the split-pin hole is to be drilled, allowing no more than  $\frac{1}{2}$  in. side movement of the rod. The split-pin hole will be within the ratchet wheel, so when you finally fit the winding rods, reverse the procedure, i.e., split pin (not opened), ratchet, washer, then through the frame from right-hand side, washer, and finally the handle, which will be secured by its own small pin. This should lock the whole winding assembly into position and keep the ratchet on the rod. The ratchet peg is also made of hardwood  $1\frac{1}{2}$  in. x  $\frac{1}{2}$  in. x  $\frac{1}{2}$  in., with a hole drilled for the fixing screw.

## MAIN STAND

The main stand should now be constructed (Fig. 3). Prepare the uprights first, four pieces of straight-grained wood 36 in. long and  $1\frac{1}{2}$  in. x  $\frac{1}{2}$  in., or slightly larger, after planing. At the top end of each piece cut out to fit main frame  $\frac{1}{2}$  in. deep x  $4\frac{1}{2}$  in., leaving 3 in. of the full width to pro-

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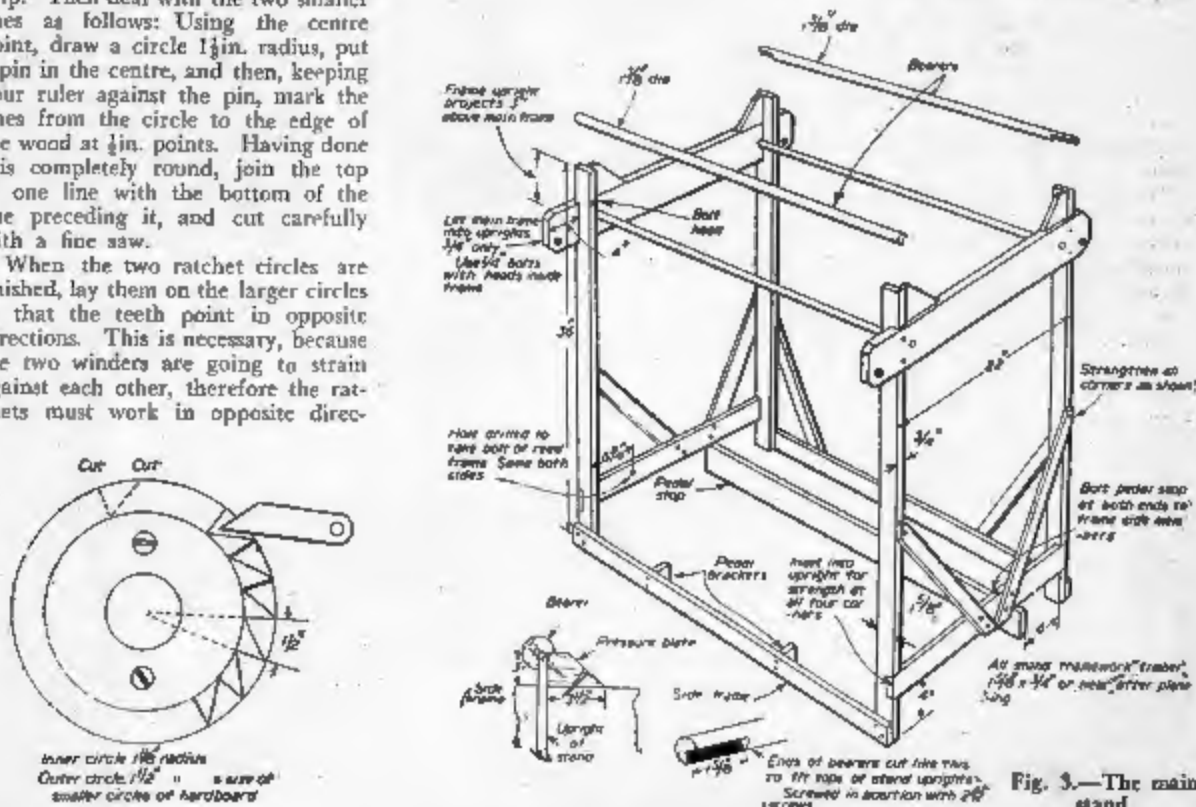


Fig. 3.—The main stand.



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ject above the frame. At the lower end, cut to let in the side pieces which carry the reed frame. These side pieces should be 4in. from the ground. The uprights should be bolted into place 4in. from each end of the main frame, using round-headed carriage bolts with the heads on the inside of the frame. Screw the side pieces on, and the bottom members at the front and back, the latter on to the face of the uprights. The pedal stop can also be fitted on the underside of the lower side pieces by means of a long bolt passing through the frame and the pedal stop. The bolts should be 1in. longer than appears necessary to allow for height adjustment later.

Next make and fit the six cross bracers to the lower corners. Four pressure plates should be made out of  $\frac{3}{4}$ in. thick wood and screwed into position on the top of the side frames and firmly against the four uprights.

Now for the bearers which, when the loom is working, carry the warp and provide the smooth, firm bearing surfaces over which the thread and the finished materials are wound on to the winding rods. The bearers should be made from close-grained hardwood not less than  $1\frac{3}{8}$ in. in diameter. On the loom described, two long handles of the type fitted to roadmen's shovels were used. These when purchased were about 5ft. long and shaped towards one end, but for at least 40in. they were of even diameter and had a smooth finish. It was only necessary to measure the exact distance across the tops of the uprights as shown in the illustration, and cut the two lengths from the handle. This measurement should be slightly less than 37in.

The ends of both bearers should be prepared for fitting over the tops of the uprights as follows: Using a compass find the centre, and through it draw two lines cutting the circle into equal quarters. Measure along the bearer  $1\frac{5}{8}$ in., or the width of the upright if different from that shown, and draw a line round a quarter of the circumference to match up with one of the quarters marked on the end. With a fine-toothed saw cut down the lines forming the quarter, and also through that portion marked on the circumference. Carefully chisel out until the quartering fits neatly over the top of the upright. Do this to each of the four ends, making sure that the matching quarter is removed



in each case. Use a 2½ in. screw for fastening the bearers to the uprights, but drill out and countersink the holes to prevent splitting both the bearer and the upright. You'll need someone to help you by holding the bearer in position while the drilling is being done. Do not drill deeper than 1½ in., because a good hold for the screw is wanted, and drive in very carefully with a large-bladed screwdriver. Note the angle at which the screws should be inserted.

When both bearers are fixed in place, make them thoroughly smooth with the finest grade glasspaper.

## HARNESS BEAM AND UPRIGHTS

The harness beam is made from a piece of wood 38½ in. x 2½ in. x ¾ in. (finished sizes), and the uprights, one 25½ in. x 4 in. x 1 in., and the long one 21½ in. x 4 in. x 1 in. The tops of both uprights should be prepared by cutting off the corners and making slots the same size as the harness beam, viz., 2½ in. down and 1 in. wide. Fit these to the main frame, the short one on the left and the long one on the right, using five 1½ in. screws for each, countersinking the heads.

The position is important, so measure from the front edge of the main side frame

be exactly on the horizontal if all measurements and fixing have been done accurately (Fig. 4).

## LAMM ASSEMBLY

The lamm assembly consists of a pivot plate 6 in. x 4 in. x ¾ in., two brackets made from 2½ in. squares of wood with one end rounded as illustrated, four lamms each 26½ in. x 1½ in. x ¾ in., and a short length of ¼ in. mild steel rod slightly inset into the end brackets before they are screwed on to the pivot

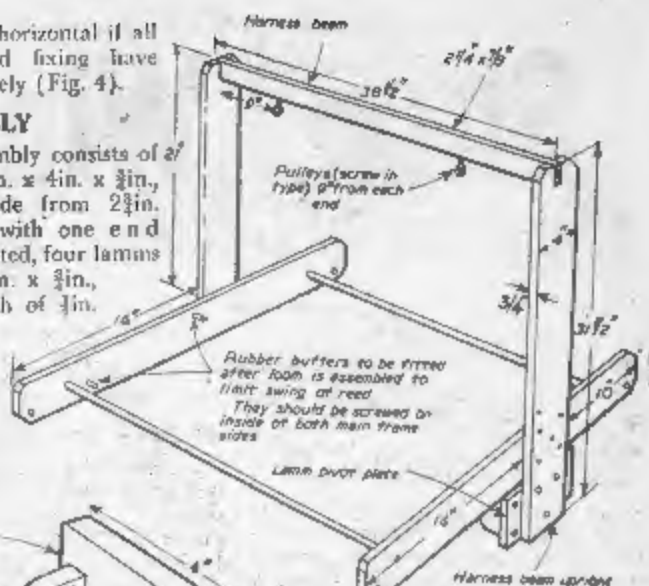
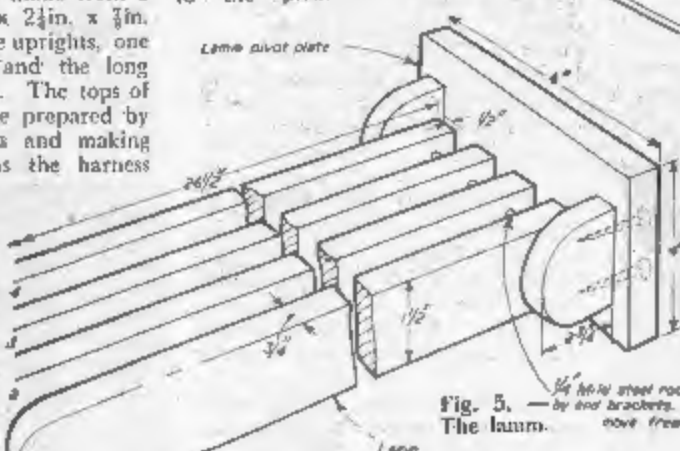


Fig. 4.—The harness beam.

The whole assembly should then be screwed into position on the long harness beam upright so that the bottom of the pivot plate and the upright coincide. Use three 1½ in. screws, heads being countersunk (Fig. 5).

Fig. 5.—The lamm. — ¼ in. mild steel rod held in position by end brackets. Lamms should move freely.



● To be completed month

This assembly is screwed firmly to the harness beam upright

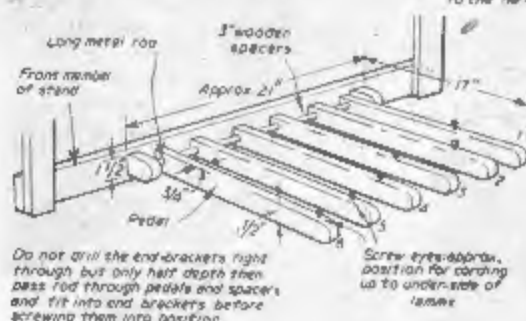
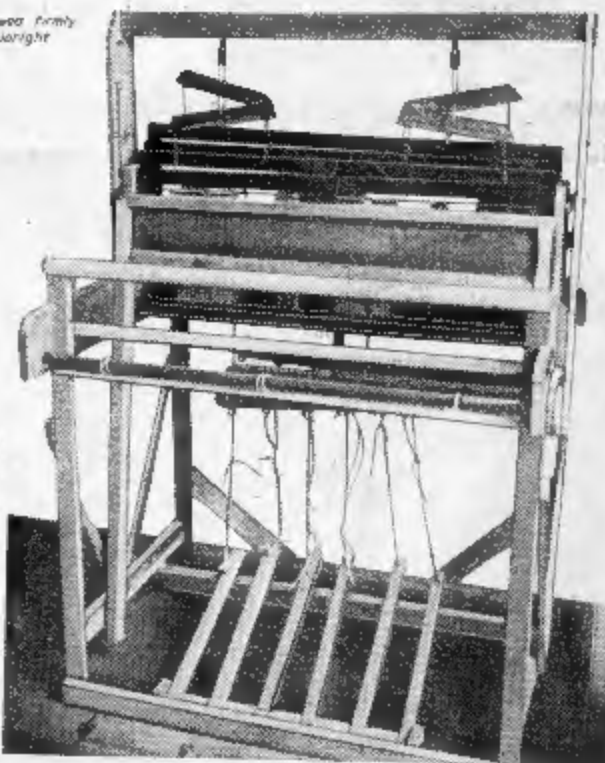


Fig. 6.—The pedal assembly.

16 in., and with a square draw a line right across each side frame; then from the back edge of the side frame measure 10 in., and draw another line across the frame. Now on both the harness beam uprights measure from the top 21 in., and with the square draw a line right across the wood. Before screwing the uprights into position fix them with a carpenter's clamp so that they are exactly between the two lines on the main side frame and the 21 in. mark is level with the top of the side frame. The harness beam should

plate. A hole should be drilled in each of the lamms to take the ¼ in. rod easily, and at 1½ in. from the end so that when the assembly is put together there is a clearance of ¼ in. between the end of the lamms and the pivot plate.

The finished loom.





**T**HE pedal assembly is similar to the previous stage. Make six pedals each 17in. x 1½in. x ¾in. (see Fig. 6 in last month's instalment), two end brackets 1½in. x 2½in., and five spacers each 3in. long, the latter from odd pieces of broomstick. Drill a hole through the spacers and pedals large enough to take the length of ½in. mild steel rod on which they pivot so that the pedals move easily. Drill only half-way through the end brackets at about 1½in. from the end to be screwed to the front stand member. The drillings through the pedals should be 1½in. from the ends. Pass the rod, which is about 20½in. long, through the pedals, inserting the spacers as indicated; and, after screwing one end bracket in

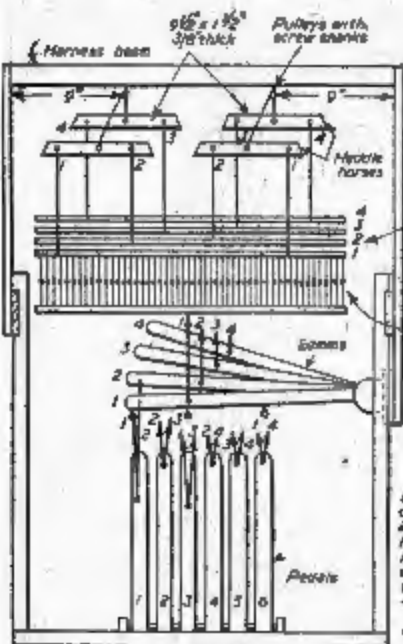


Fig. 8.—Cording up from harness beam to pedals.

position, insert one end of the rod into it; clip the other bracket so that there is free movement of the pedals; and screw that in position.

## THE REED

The reed is a manufactured article which cannot be home produced, but manufacturers will undertake to supply various parts, such as a 32in. reed, 14 dents to the inch, which will solve the problem. One such manufacturer is J. H. Wilson, of 44 Minter Street, Canterbury, N.S.W.

The reed-holder final measurements will depend on the size of the reed when received. The holder can be constructed in the main as follows:



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necessary only to fix it by means of two bolts to the lower side members of the stand at the points indicated in Fig. 2. The bolts should be long enough to allow the reed-holder to swing and two nuts locked together on each bolt will ensure a constant position. Do not fit the reed-holder until the cording up has been done.

## HEDDLE OR HEALD FRAMES

The heddle or heald frames constitute the shafts.

If string healds are used, each frame consists of two pieces of dowel-rod about ½in. diameter and 34in. long upon which the healds are looped, the top rod being corded to the heddle-horses to be shown later and the lower rod being corded to the appropriate lamm.

If wire healds are used, a more complicated frame will also be necessary. This is based on the two dowel-rod but with end pieces of ½in. x ½in. mild steel strip to act as holders for two thin metal rods the same size as the loops on the two ends of the wire healds. The strips should be drilled at each end for screwing on to the ends of the dowel-rods to make a complete rectangle, and half an inch below the surface of the dowel-

Timber 1½in. x 1in. should be used and be cut to lengths as shown in Fig. 7, but the inset joints between the uprights and cross-

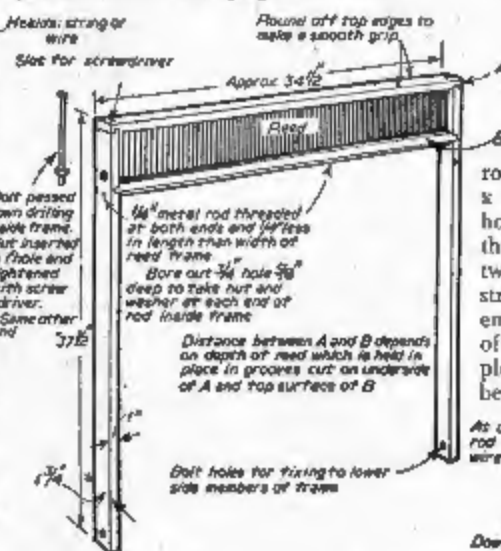
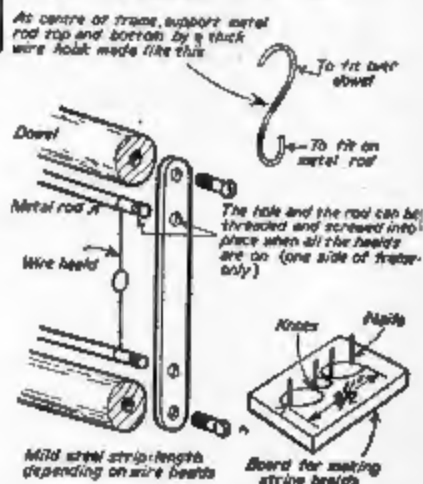


Fig. 7.—(Above) Details of reed assembly.

Fig. 9.—(Right) Construction of heddle frame for wire healds.

pieces and the grooves on the inside surfaces of the crosspieces must be dealt with when the size of the reed is known. The width of the reed-holder must not exceed 34½in., i.e., the inside measurement of the loom main frame less an allowance of ½in. for the backward and forward movement. When it is completed it is





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## ● The second of two articles describing a simple loom that will weave fabrics up to 32 inches wide

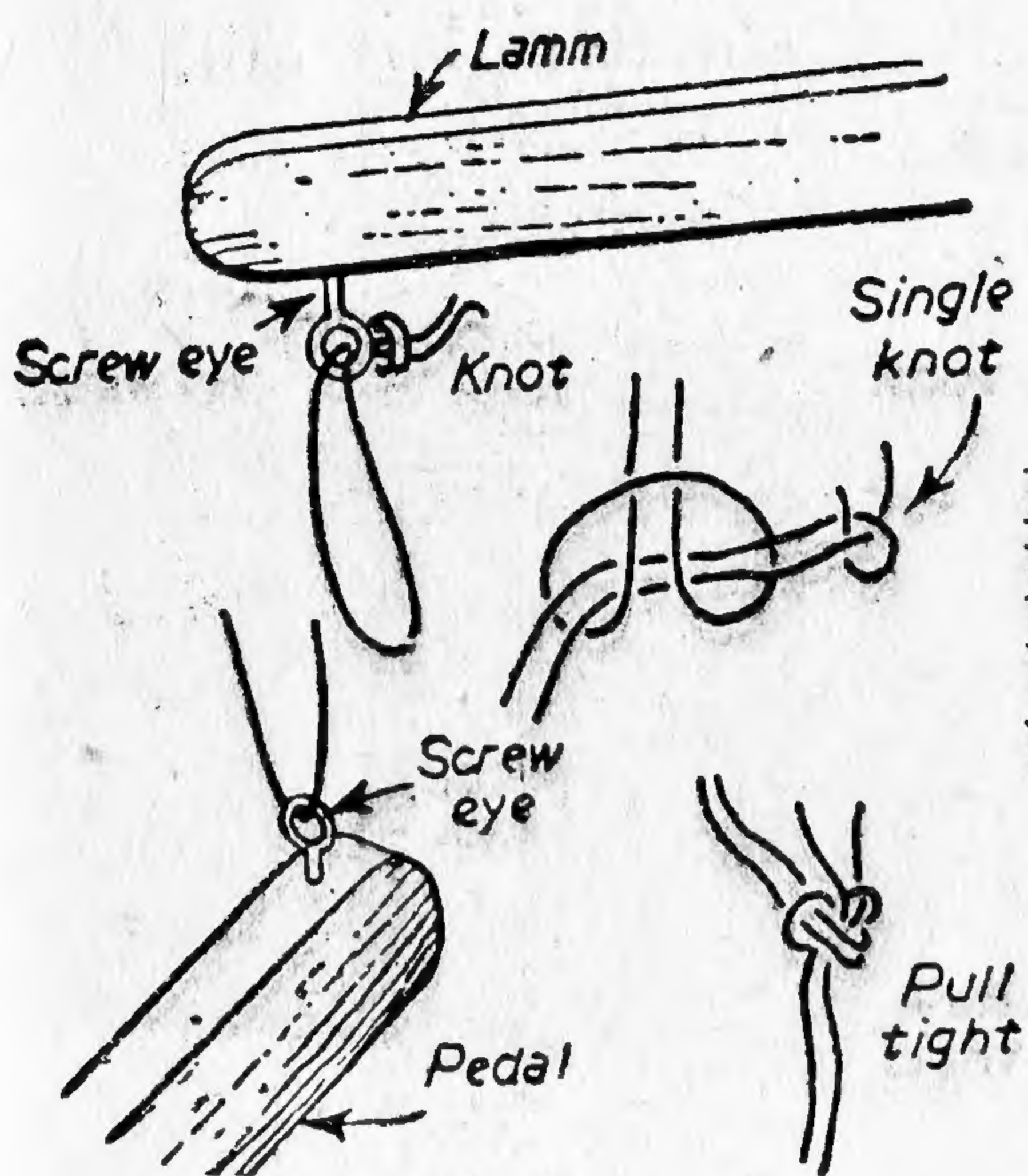


Fig. 11.—Method of tying knots when cording up.

rods so that the metal rods can be slipped into position after the wire healds have been threaded on. The holes should be such that the metal rods are a tight fit or, alternatively, the rods and holes should be threaded on one side of the frame so that they remain screwed together. The cording up is done in the same way as for string healds.

Both string and wire healds can be obtained from handcrafts supplies firms, but it is quite possible to make the string ones at home and a board suitable for the purpose is shown in Fig. 9.

The heddle-horses are self-explanatory (see Fig. 8), and the cording-up can now be done using loom cord,

which is also available from handcrafts suppliers. Study Fig. 10 and note that the warp under tension runs in a horizontal line between the two bearers, so for the purpose of cording-up tie two pieces of cord round the back winder, each piece about 6in. from the side of the main frame. Carry the cords over the bearers and tie on to the winder at the front of the loom. Now, taking the two pairs of heddle-horses and dealing with each in turn, thread a piece of cord through the centre hole and double-knot it. Pass the other end of the cord above the pulley and thread through the centre hole of the other horse, allowing about 4in. of cord on either side of the pulley. Knot the cord, but leave at least 1ft. of cord hanging free before cutting off and do the second pair in the same way. Take the top bars of the four heddle frames and number them from 1 to 4, front to back. Holding them or resting them on the two cords stretched across the bearers so that their ends are equidistant from the harness beam uprights, mark on them the points at which you will drill them to take cords dropped from the horses suspended above,

as shown in Fig. 8, i.e., Bar 1, two outer holes on horse one, left and right; Bar 2, two inner holes on horse one, left and right; Bar 3, two inner holes on horse two, left and right; and Bar 4, two outer holes on horse two, left and right. Drill holes and cord up as directed from the horse to pulley, i.e., double-knot the cord, pass it through the hole in No. 1 horse on right and then down to the hole on No. 1 Bar, allow about 6in., knot and cut cord, leaving about 1ft. to spare.

### ATTACHING THE HEALDS

Continue until all bars are corded to the heddle-horses. Now check for  
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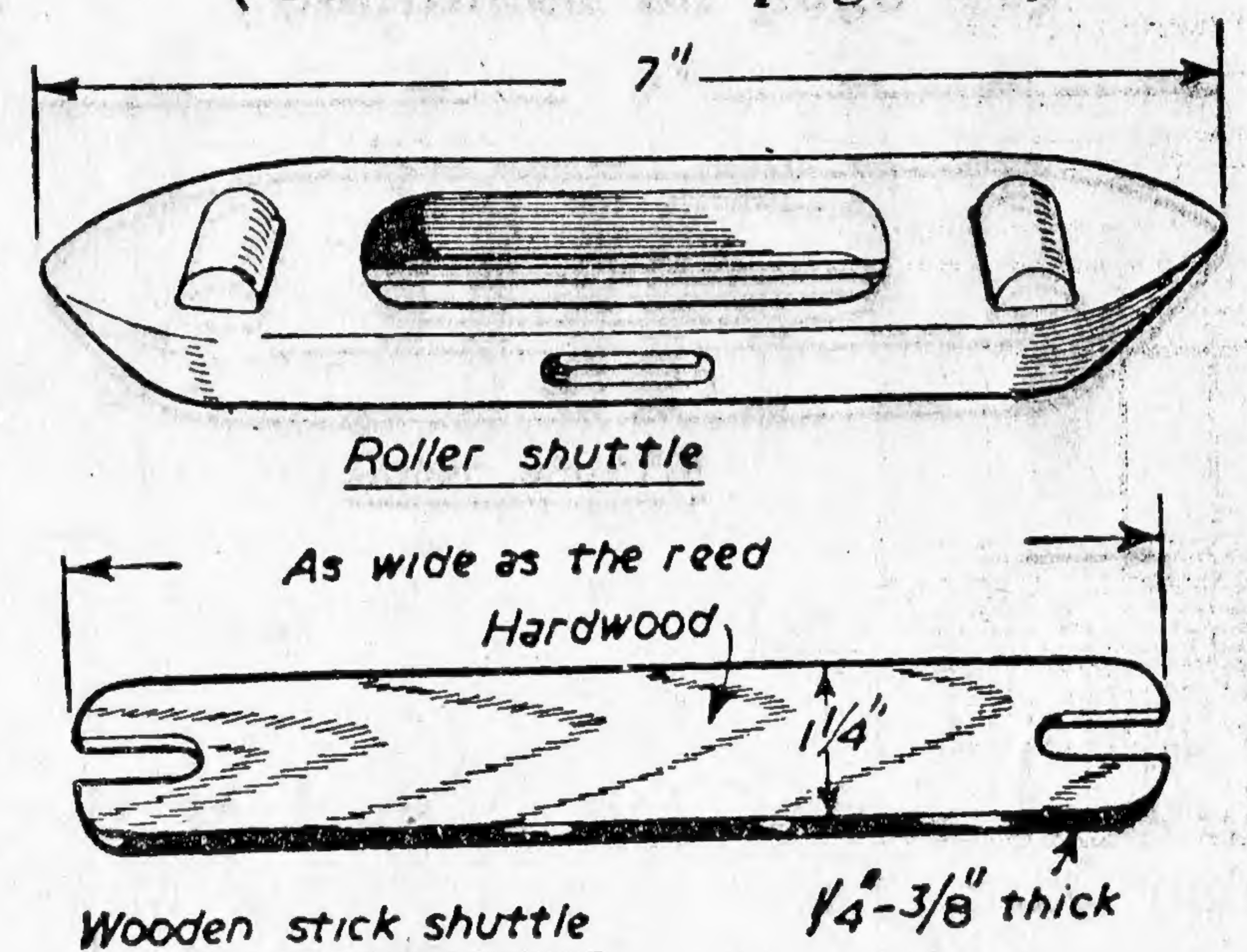


Fig. 12.—Roller shuttle (top) and wooden stick shuttle.

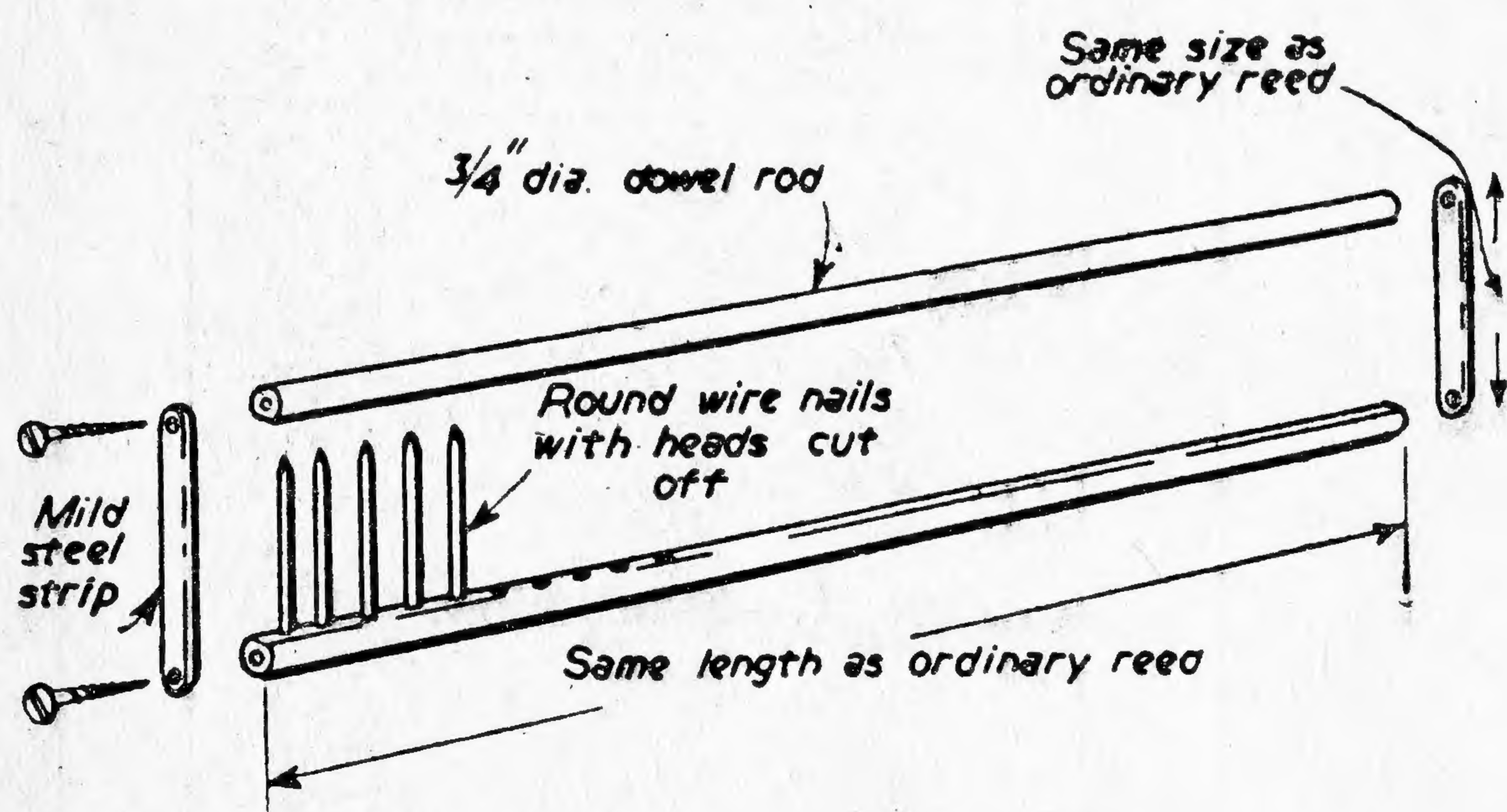
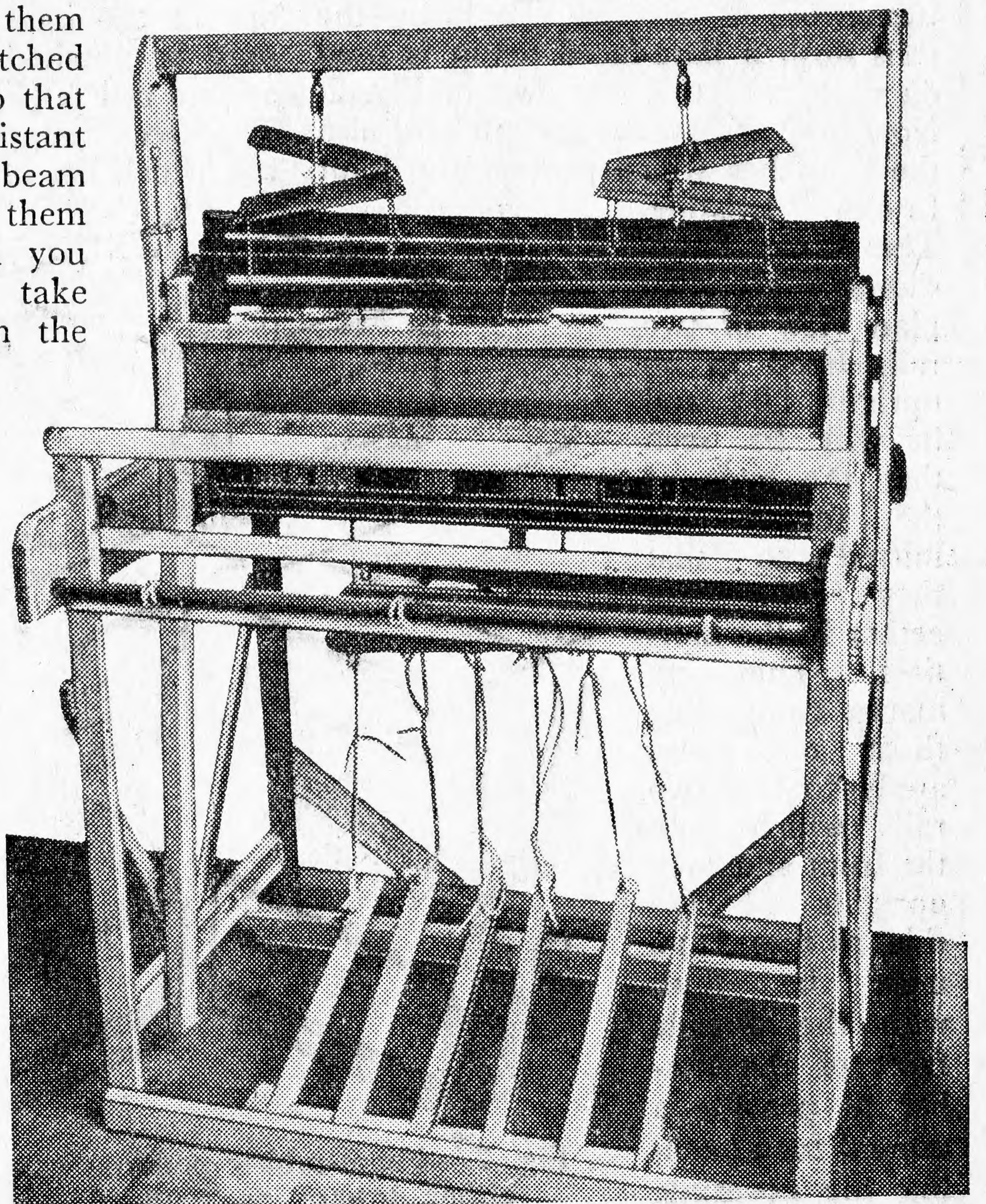


Fig. 14.—Construction of rug reed. Plane the two inner surfaces of dowel rods and drill holes for wire nails at  $\frac{3}{4}$ in. intervals. Length of nail depends on width of the ordinary reed, as the two reeds must be identical in size to fit the reed frame.



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position by attaching two healds to each of the bars of the heddle frames. If you are using wire healds you must assemble the heddle frames at this stage, but before cording to the horses until the cords from the front winder and after the frames are in position with the wire healds set them. The healds should be placed so that it can be seen whether the cords running from bearer to bearer are on the same level as the centre eyes of the healds, when the four heddle frames are level and the horses are horizontal. If they are not, then adjust the lengths of all cords by untying and reknitting until the heald eyes are in line with the position which the warp will occupy as indicated by the stretched cords. Next fix a screw-eye on the top edge of each of the lamms immediately under the centre point of each heddle frame, where a hole should be drilled.

## CORDING THE LAMMS

Cord up the lamms to the heddle frames, No. 1 lamm to No. 1 heddle frame, and so on. You should finish up with lamms horizontal and level when the frames above are all level.

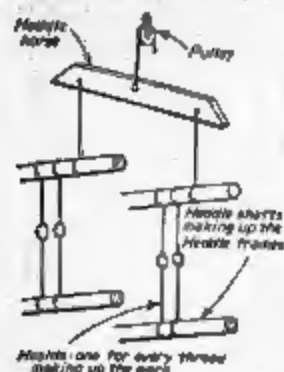


Fig. 10.—Cording up should be done so that with the four heddle shafts level the pedals are about 3in. above the pedal stop, shown in Fig. 3. This length may vary with different pedals, but the distance of travel should be only sufficient to raise the heddle shafts about 2in. above the normal rest level. Heddle frames or shafts for use with string healds are made from hardwood strips 1in. x 1in. and slightly longer than the width of the reed. Drill holes for cording up after the position of the heddle horses has been settled.

The most difficult part is now to be undertaken, and it is advised that the knot shown in Fig. 11 should be practised before cording up the pedals to the lamms.

Start with pedal 1 and lamms 1 and 2. About 1in. from the ends of lamms 1 and 2 fix two screw eyes and immediately below on pedal 1 fix an eye. Now raise the pedal about 3in. above the pedal-rest or stop and put something under it to keep it in that position until the cording is done;

also get someone to hold the heddle frames so that they all remain at the same level while the pedals are being connected up. Cut 18in. of cord and knot the two ends together and thread it through the eye on

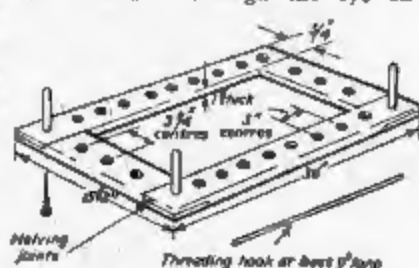
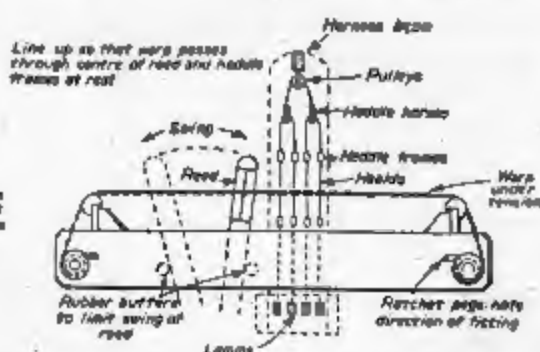


Fig. 13.—Method of constructing warping board. Pegs are 6in. lengths of broomstick, sandpapered absolutely smooth. Four corner pegs should be screwed into place with long screws which pass through boards and hold frame together. Make four extra pegs for placing in any position according to length of warp required. Holes should be 1/2in. deep and pegs should fit tightly.

No. 1 lamm, then cut another piece of cord 24in. long and tie it at its centre to the eye on pedal 1. Make a loop in the cord which hangs from lamm 1, as shown in Fig. 11, pass the two ends from pedal 1 through, and



tie the two ends together in a single knot, at the same time pulling the cord through the loop until the pedal is in its correct position 3in. above the rest and the lamm is horizontal. Now pull the two ends of the single knot cord tight against the loop and the operation is finished. This knot should be kept quite firm, yet you can adjust it simply by slackening top and bottom cords and pulling on the single-knot strings.

Follow this method for cording-up

all the lamms and pedals in the order shown in Fig. 8. As you come to pedals 4, 5, and 6 you will notice that the leverage is less, and to make for easy operation screw the eyes in the lamms away from, rather than near to, the pivot so that the cords will lean to the left and not be directly vertical from the pedals.

When the cording is finished, depression of the pedals, one at a time, should have the effect of raising two heddles and lowering two heddles simultaneously, because by pulling on, say, 1 and 2 with No. 1 pedal the horses will tip, and raise 3 and 4 automatically. Untie the two cords stretching from front to back for testing purposes; they will not be needed again.

The reed-holder can now be fitted as shown in Fig. 7, also the rubber buffers on the inside of the main frame to restrict the forward and backward movement of the reed to the distance required. This should be just clear of the heddle frames at the back, and 3in. forward of the front bearer at the front. The winding rods and ratchets can now be put in place, as detailed in Fig. 1, and the loom is ready for threading up.

## ACCESSORIES

The following accessories will be required for use with this loom: 4 1/2 gross of string or wire healds; 2 warp-ropes each 34in. long, made from 1/2in. dowel-rod; 2 roller shuttles (see Fig. 12); 4 stick shuttles, 32in. (Fig. 12); 1 threading hook; 1 warping board (details of construction Fig. 13); 1 rug reed, if woven rugs are attempted (Fig. 14 shows reed made to fit into the reed-holder after the ordinary reed has been removed).

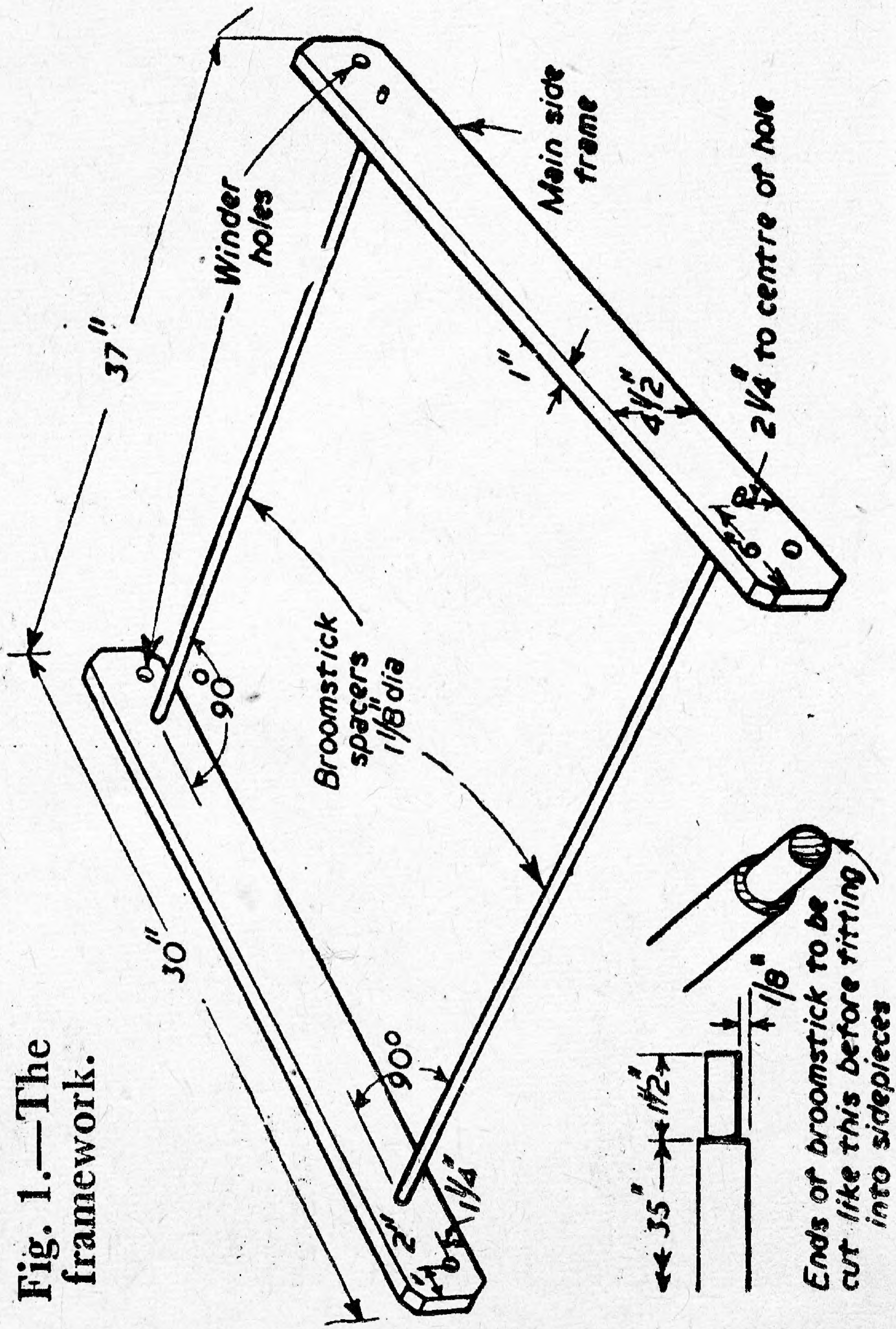
The firm of J. H. Wilson, referred to earlier in this article, can supply all loom parts.

The large number of healds is necessary because (if material or towels or even curtains 32in. wide are attempted) for every thread in the warp (and there will be 32 by 14 = 448 + 4 for selvage = 452) there must be a heald on the shafts for the thread to pass through, so that in operating the loom the threads are parted by the movement of the shafts to form the shed. The ordinary reed is a 14 dent, which means there are 14 spaces through which threads pass to every inch of the reed.

Two types of shuttles, roller and stick are mentioned. The roller shuttle is much faster in use when doing ordinary weaving, but the stick shuttle is used when making rugs or heavy woollen material.



Fig. 1.—The framework.





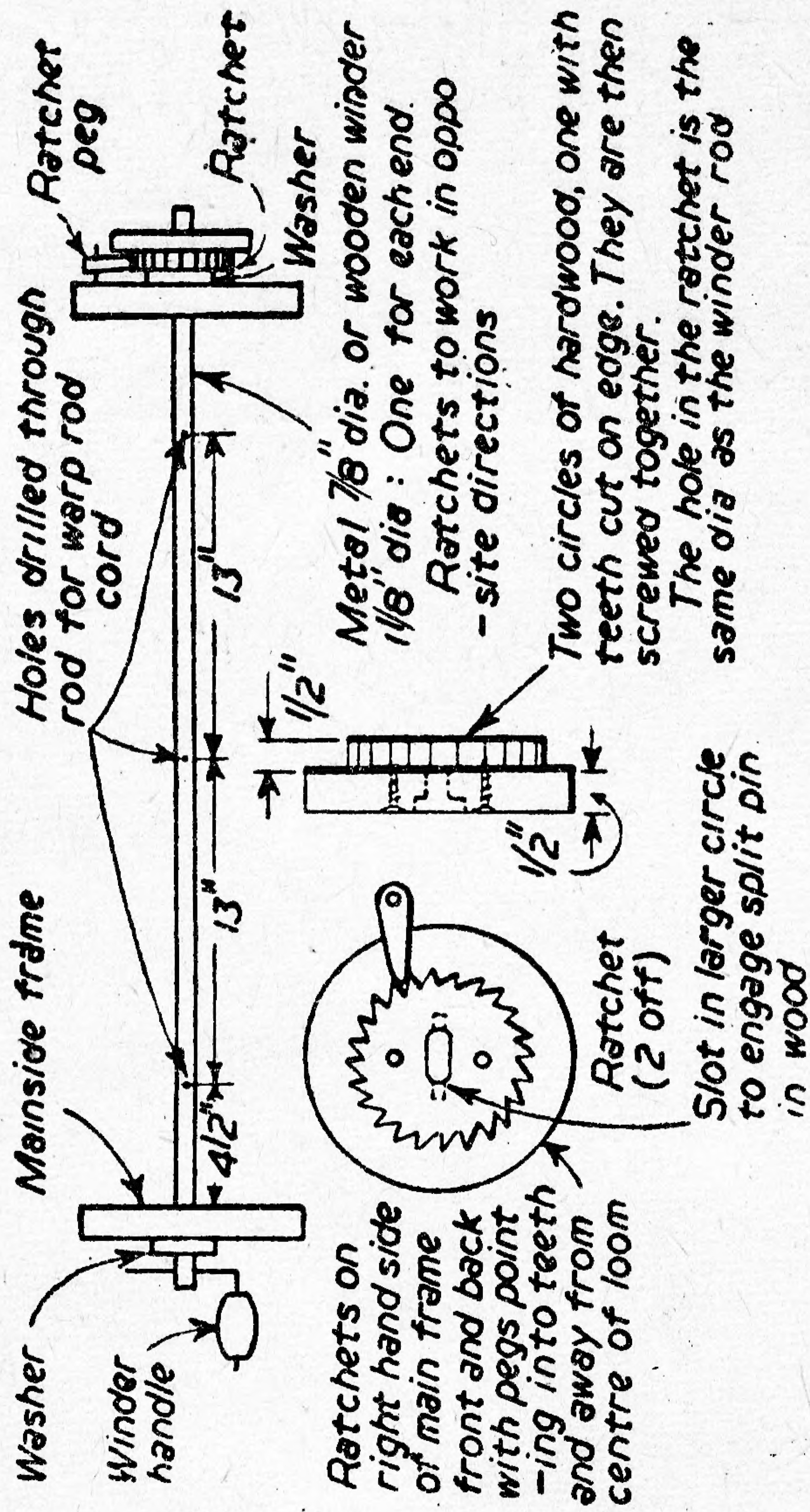
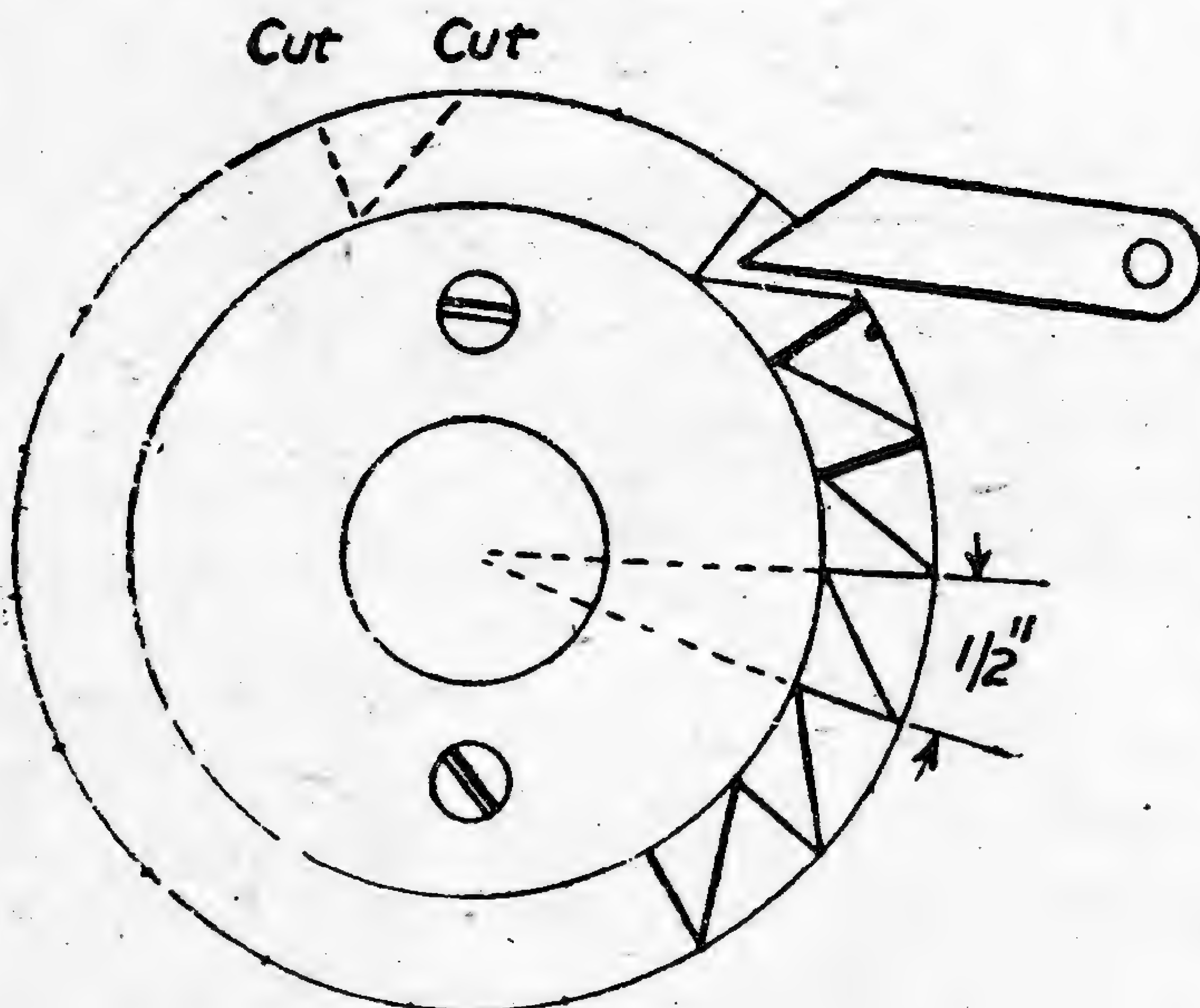


Fig. 2.—Winding rods and ratchets.





Inner circle  $1\frac{1}{8}$ " radius  
 Outer circle  $1\frac{1}{2}$ " " = size of  
 smaller circles of hardboard

**Fig. 2a.—Winding ratchets.**



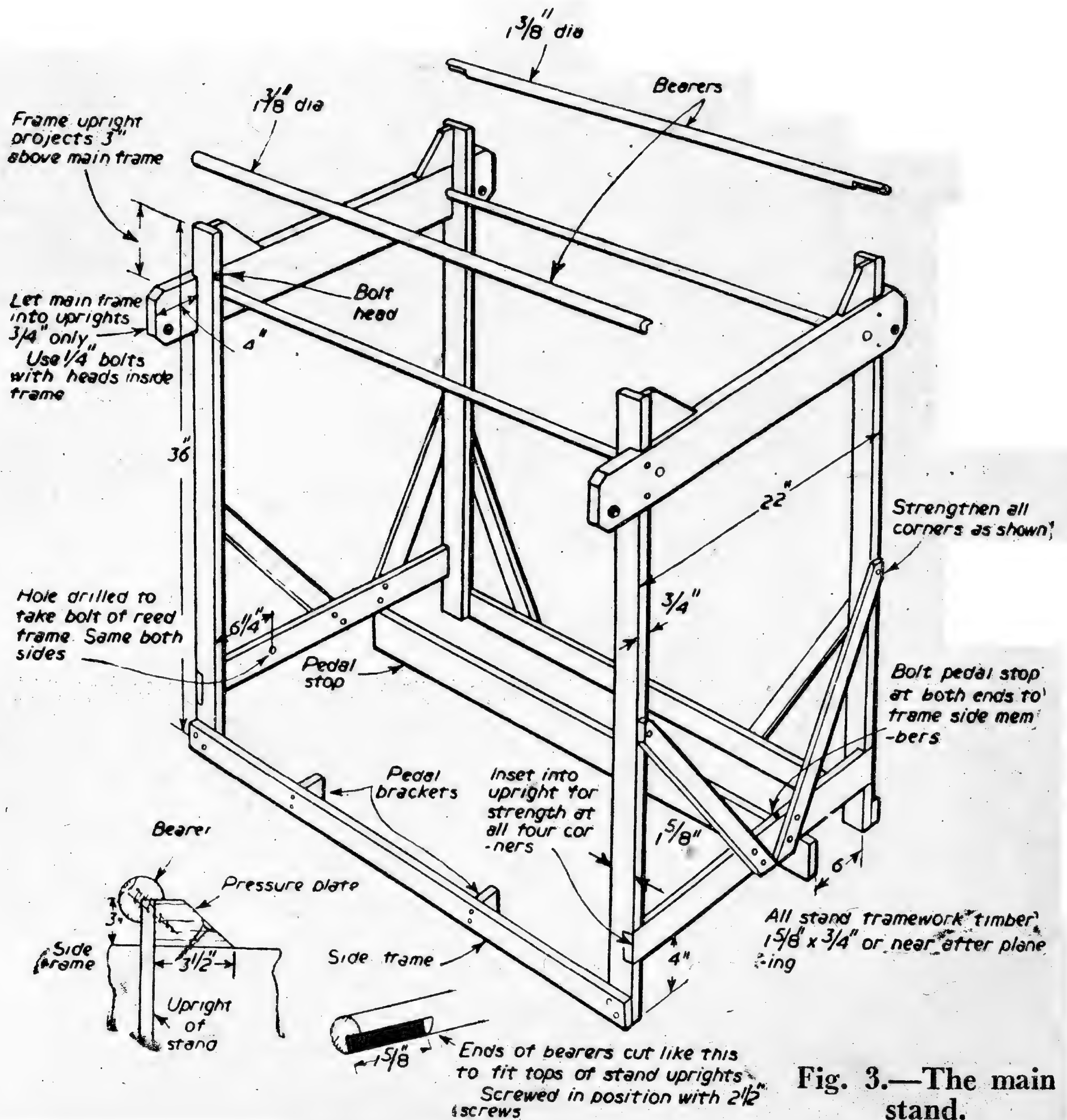


Fig. 3.—The main stand.



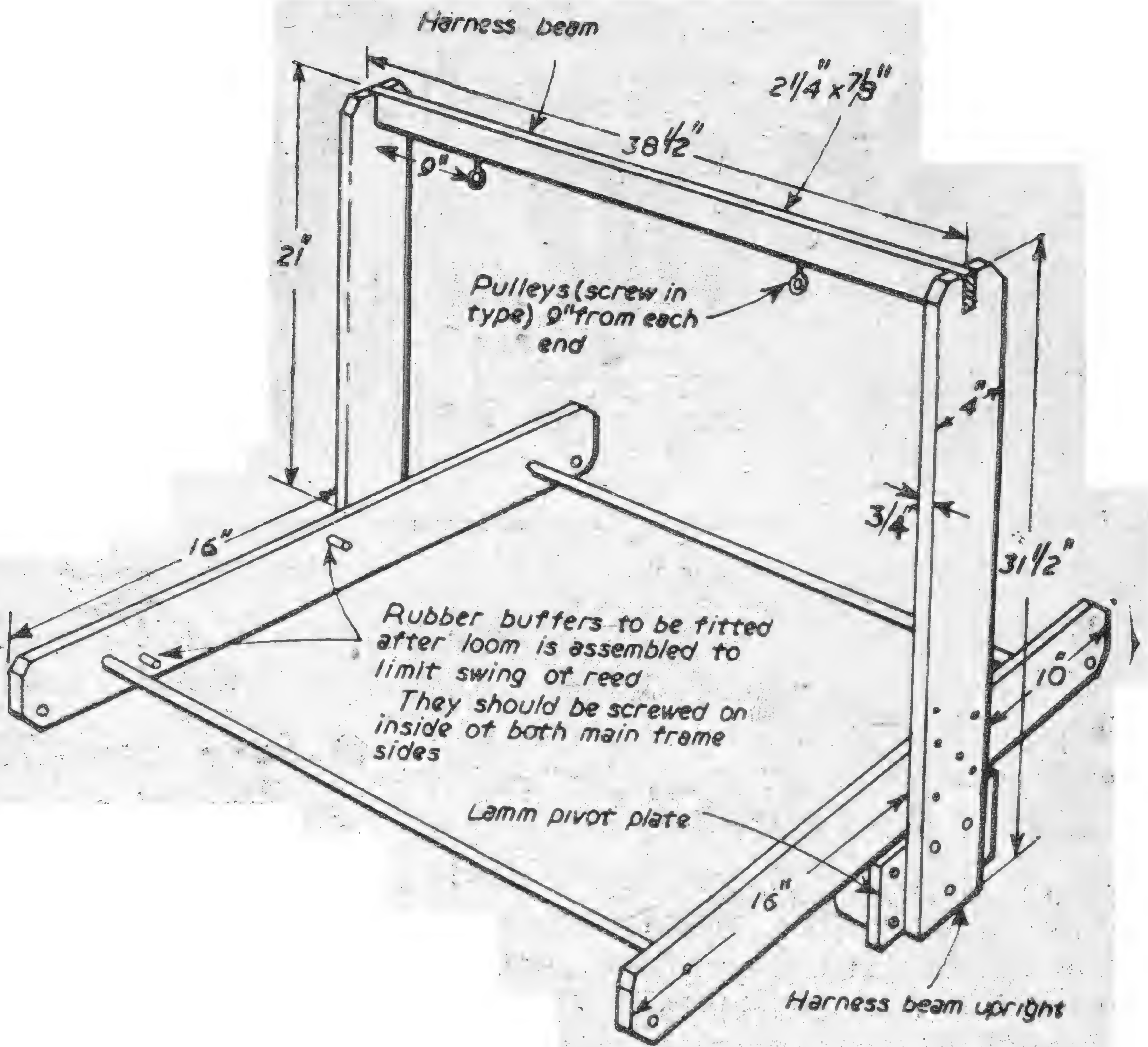


Fig. 4.—The harness beam.



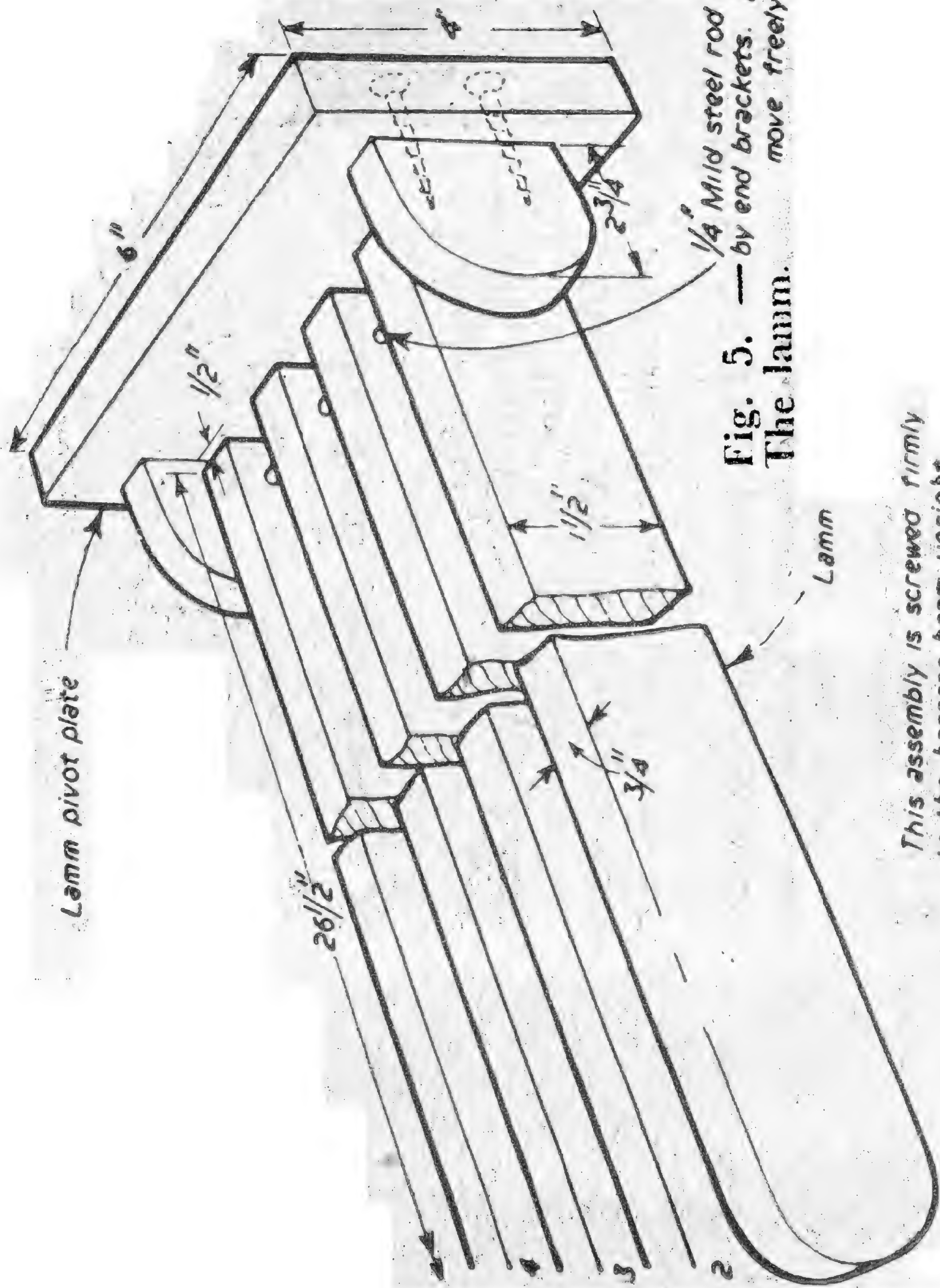
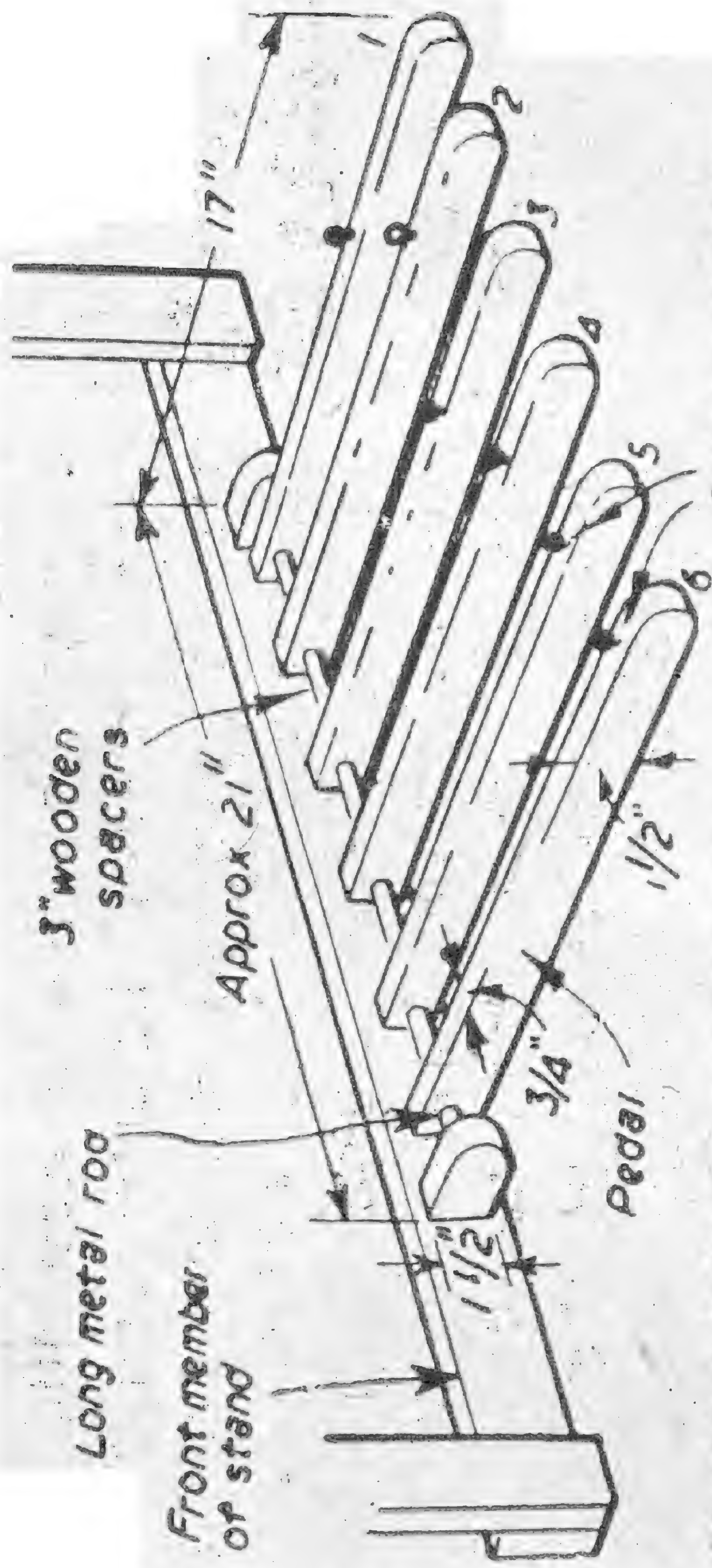


Fig. 5. —  $\frac{1}{4}$ " Mild steel rod held in position by end brackets. Lamm should move freely. The lamm.

This assembly is screwed firmly to the harness beam upright





Do not drill the end brackets right through but only half depth then pass rod through pedals and spacers and fit into end brackets before screwing them into position

Screw eyes: approx.  
position for cording  
up to under-side of  
18mm

Fig. 6.—The pedal assembly.



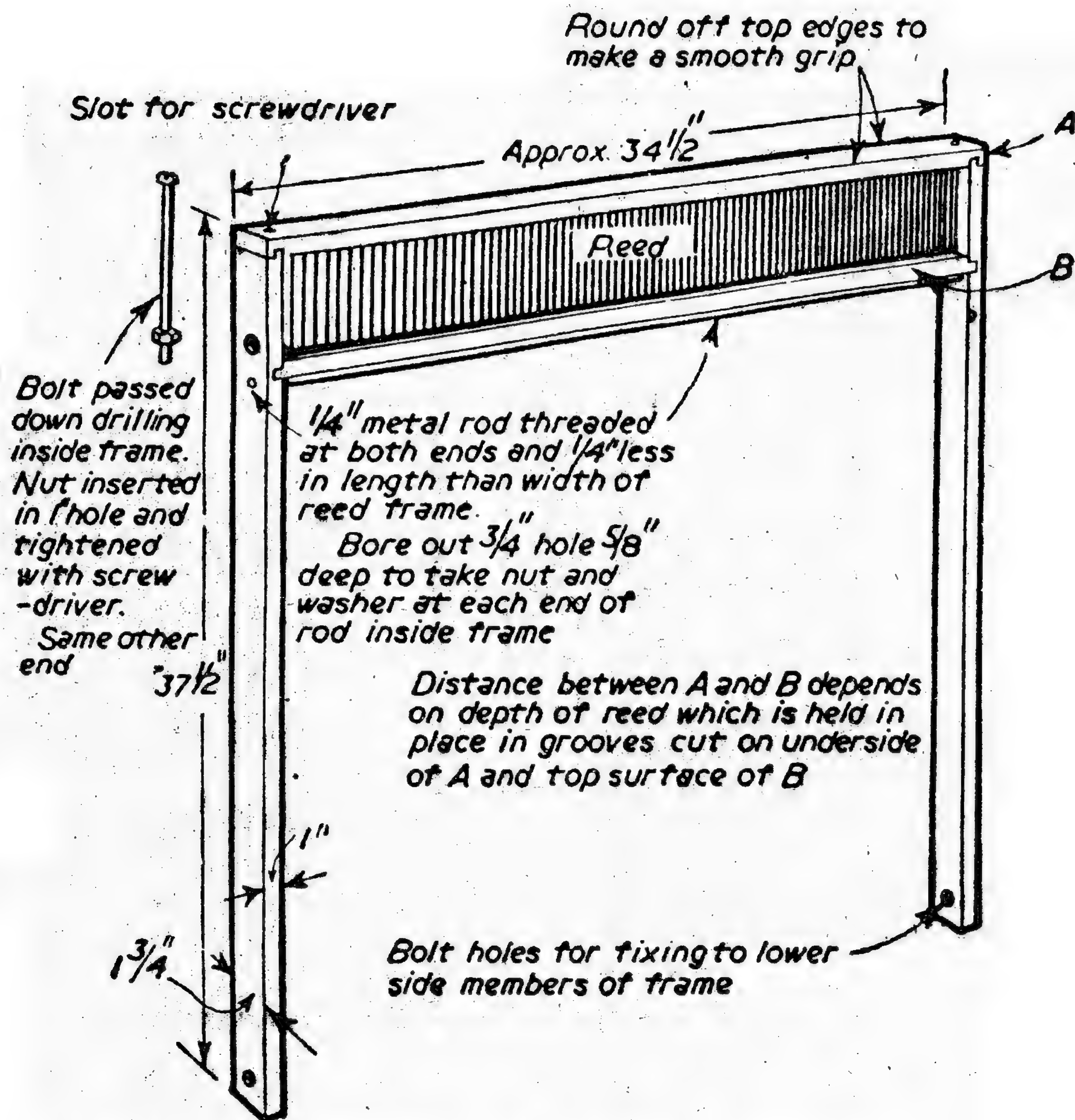


Fig. 7.— Details of reed assembly.



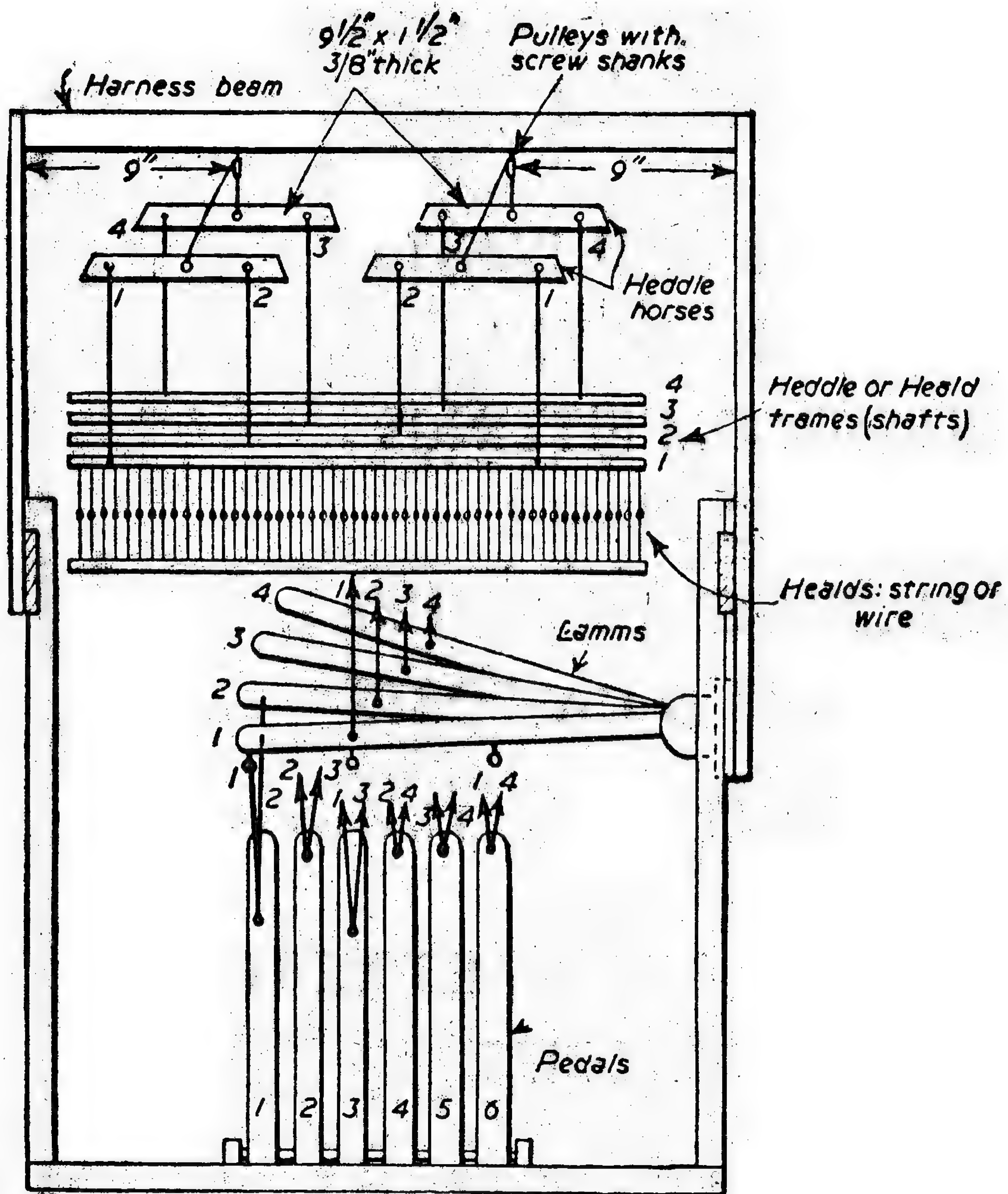


Fig. 8.—Cording up from harness beam to pedals.



At centre of frame, support metal rod top and bottom by a thick wire hook made like this

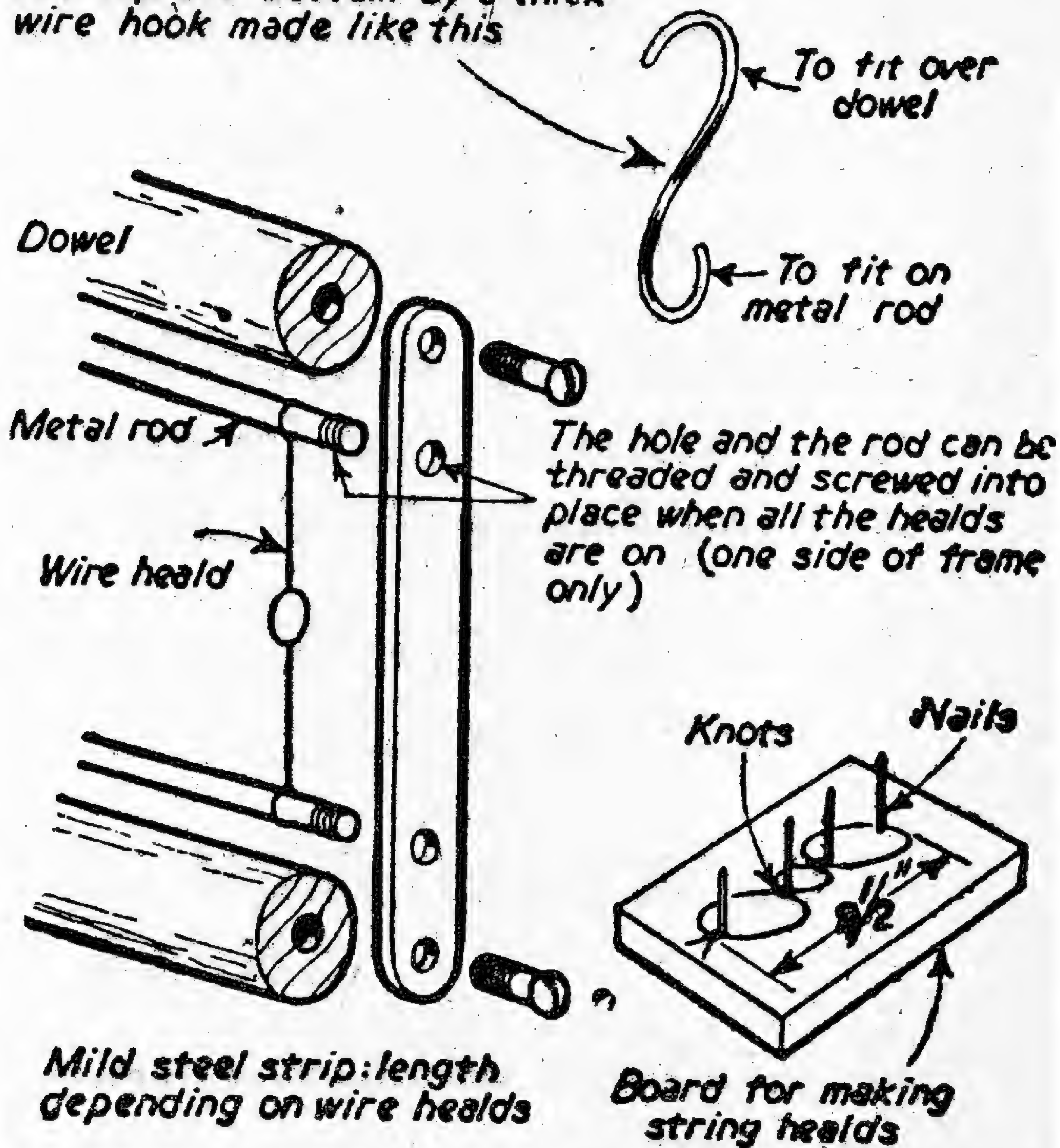


Fig. 9.— Construction of heddle frame for wire healds.



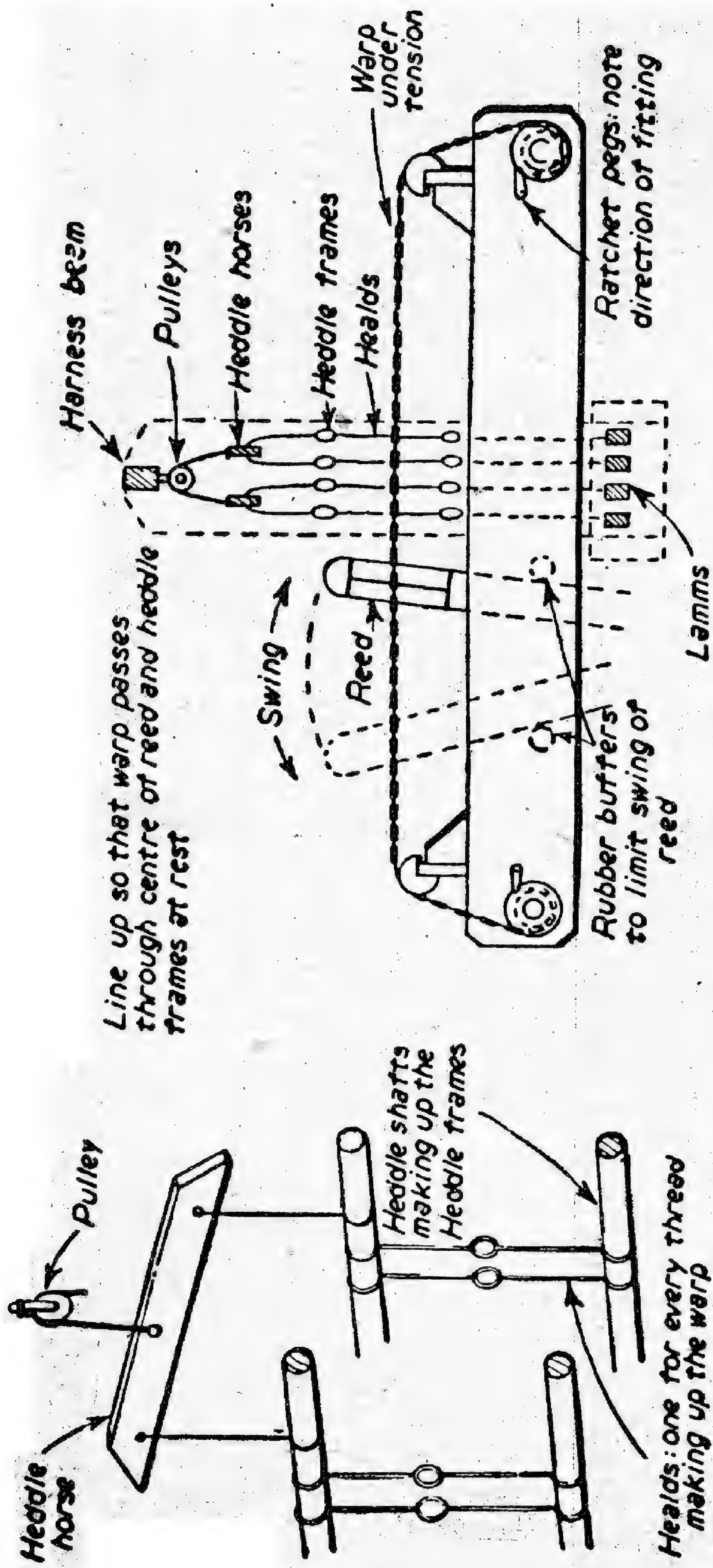


Fig. 10,—Cording up should be done so that with the four heddle shafts level the pedals are about 3in. above the pedal stop, shown in Fig. 3. This length may vary with different pedals, but the distance of travel should be only sufficient to raise the heddle shafts about 2in. above the normal rest level. Heddle frames or shafts for use with string healds are made from hardwood strips 1in. x  $\frac{3}{8}$ in. and slightly longer than the width of the reed. Drill holes for cording up after the position of the heddle horses has been settled.



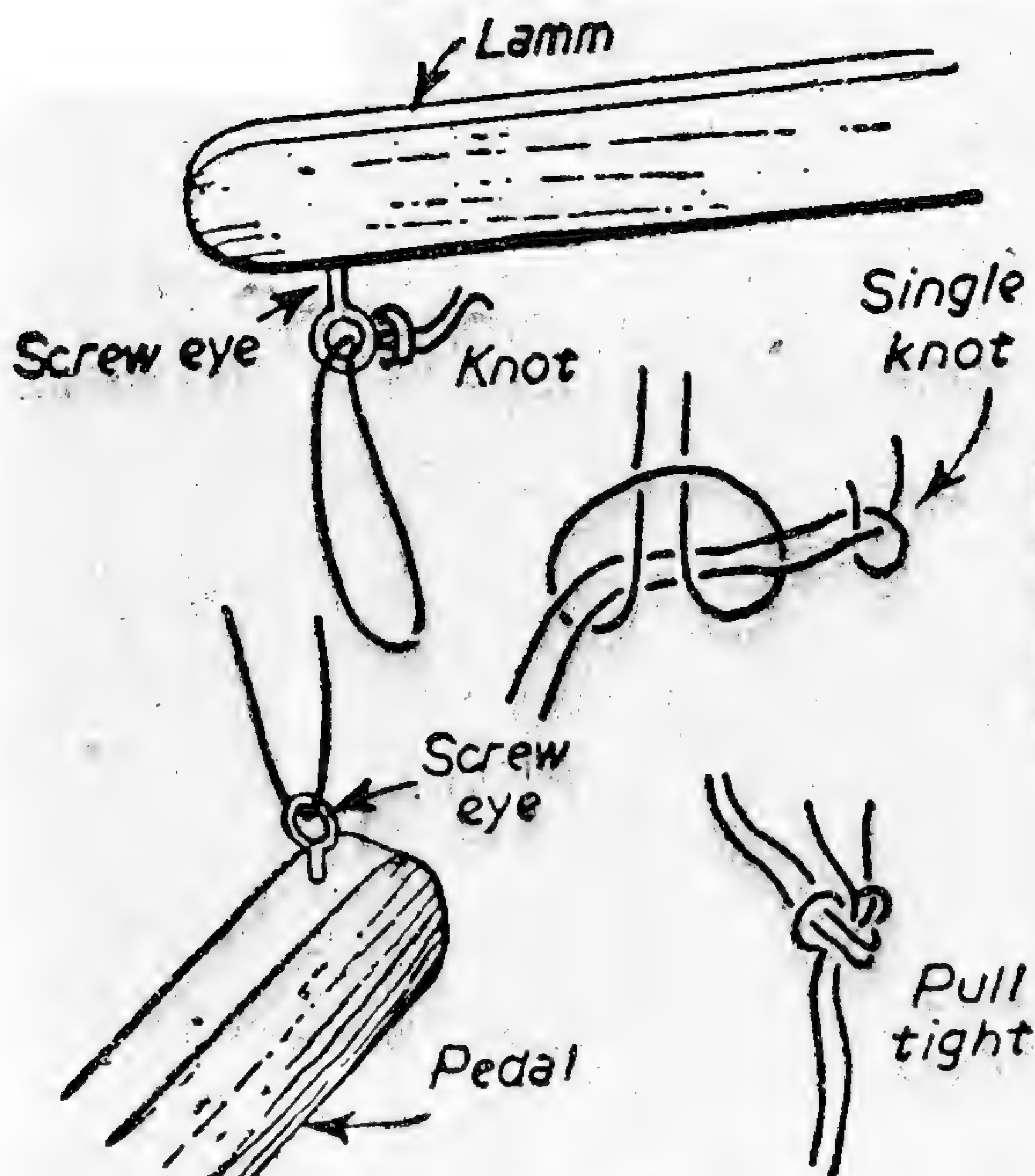


Fig. 11.—  
Method of  
tying knots  
when cord-  
ing up.

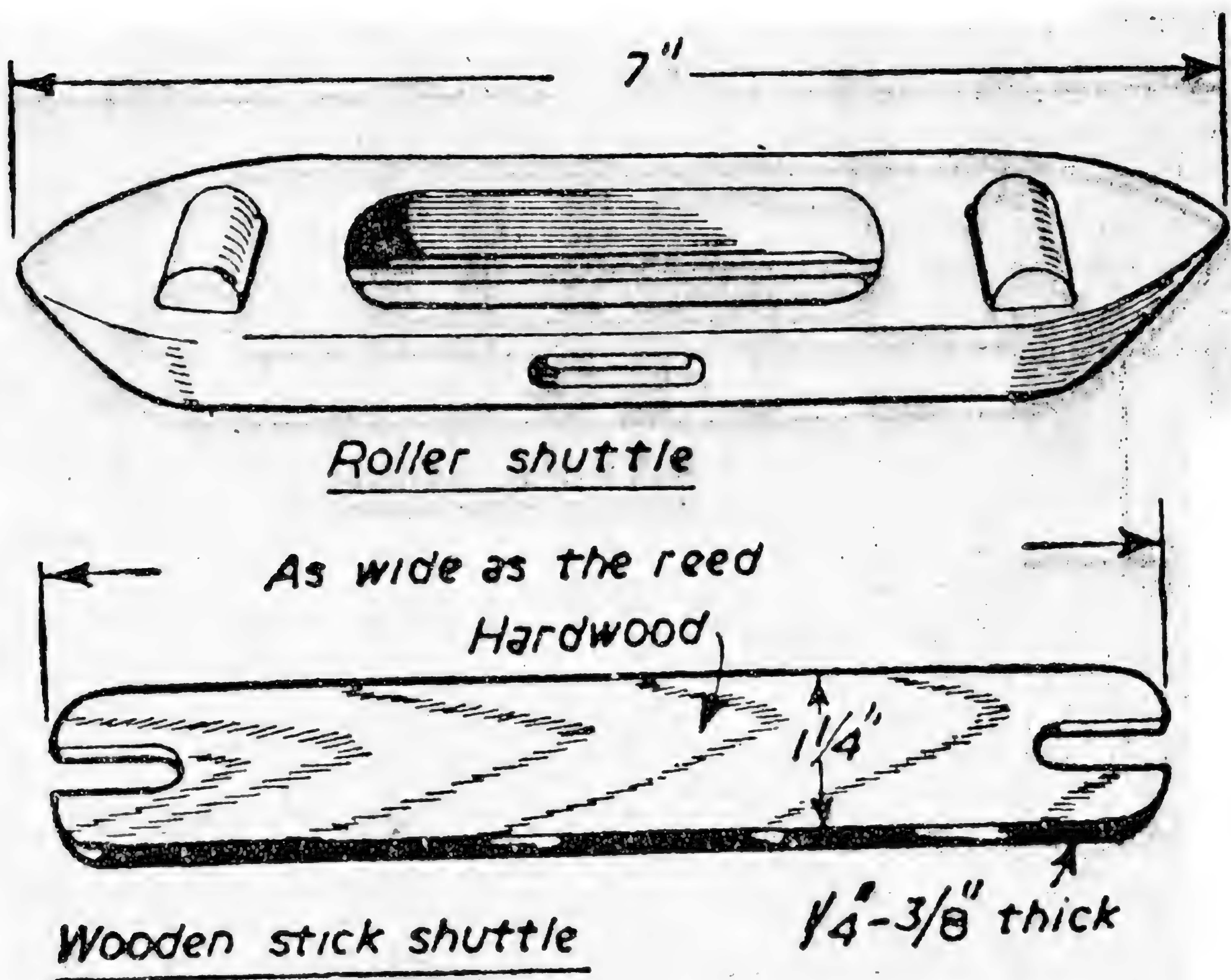


Fig. 12.—Roller shuttle (top) and  
wooden stick shuttle.



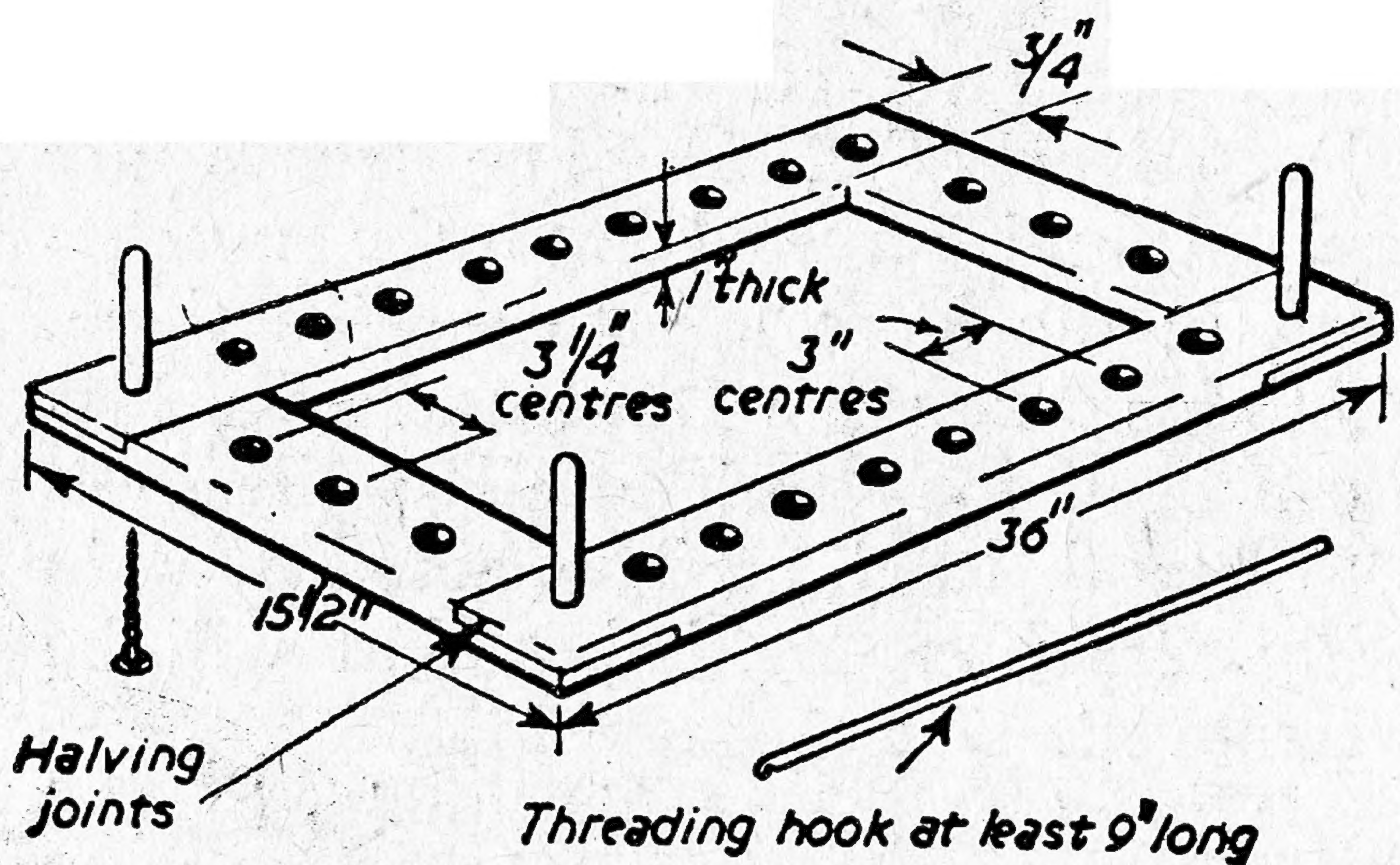


Fig. 13.—Method of constructing warping board. Pegs are 6in. lengths of broomstick sandpapered absolutely smooth. Four corner pegs should be screwed into place with long screws which pass through boards and hold frame together. Make four extra pegs for placing in any position according to length of warp required. Holes should be  $\frac{5}{8}$ in.- $\frac{3}{4}$ in. deep and pegs should fit tightly.



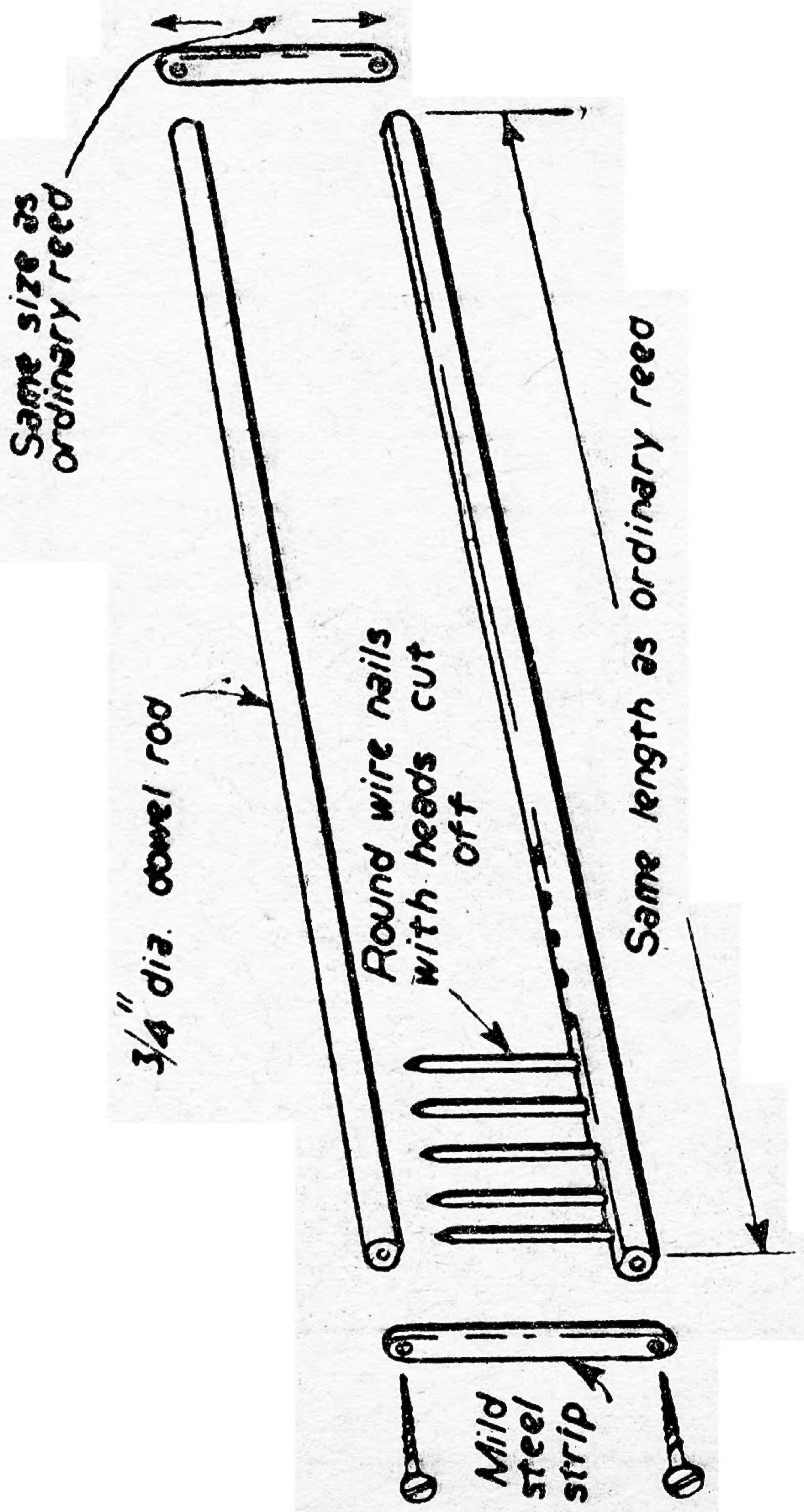


Fig. 14.—Construction of rug reed. Plane the two inner surfaces of dowel rods and drill holes for wire nails at  $\frac{3}{4}$  in. intervals. Length of nail depends on width of the ordinary reed, as the two reeds must be identical in size to fit the reed frame.



